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Combination of cable ties and barbed sutures for fasciotomy closure – two case reports

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Summary

While fasciotomy is the only urgent treatment option for compartment syndrome, the resulting open wound leaves room for complications. Closure of the wound can be done by different techniques, including split-thickness skin grafts, negative pressure therapy, an absorbable barbed suture system and a cable ties system. The aim of this paper is to demonstrate how a combined application of these methods can reduce their respective individual disadvantages. Our combined method was tried in two patients, one with an open tibial fracture and the other who underwent ulnar nerve reparation. Both patients started exhibiting signs of compartment syndrome within 3 hrs after surgery. Firstly, absorbable barbed suture systems were positioned with the running intradermal technique. Following this the cable ties were inserted and the limb in question was placed in an elevated position. Complete closure of the patient's wounds was achieved within 2 weeks without complications. This result is a testament to the added benefit of a combination of these methods in comparison with the results they produce individually.

Key words

fasciotomy – wound closure – compartment syndrome

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Introduction

Fasciotomy is the only option for urgent treatment of compartment syndrome. However, even a successful decompression can result in a large wound which can jeopardize the endangered extremity. Secondly, considering the wound becomes increasingly difficult to close primarily with time, options for wound closure should be evaluated as soon as possible. Closure is traditionally done by covering the wound with a split-thickness skin graft, and while this is simple, reliable, and generally available, it carries substantial morbidity. Several novel techniques were proposed for closure of fasciotomy wounds, some of which are simple but less effective, and others which are more complicated and often entail increased costs [1–3]. The use of negative pressure therapy increases the probability of primary wound closure, and can also be a useful adjunct to skin grafting. Two methods for fasciotomy wound closure that have recently gained popularity are the absorbable barbed suture and cable tie systems [4,5]. After analysing both techniques, we decided to combine them in a way we thought would achieve fast and effective wound closure.

Case description

Our combined method was tried on two patients. The first was a 35-year-old patient who underwent left ulnar nerve reconstruction four months prior. Three hours after surgery, he started displaying signs of compartment syndrome. Fasciotomy of the forearm was performed, releasing the anterior compartment. Muscles appeared well-perfused and contracting. The arm was placed in strict elevation and anti-edematous therapy was given. Over the next 2 days, the swelling of the muscles subsided, and closure of the wound was initiated on the 3rd postoperative day. Cable ties were sterilized and then assembled during the operation. We followed the instructions given by Govaert et al. [5] and positioned surgical staples evenly 2 cm apart (Fig. 1). Before inserting the cable ties, we positioned two absorbable barbed suture systems with the running intradermal technique starting from the edge of the wound as described by Özyurtlu et al. [4]. The wound was dressed with Vaseline gauze and sterile moist drapes. Postoperatively, the extremity was continuously held in an elevated position. The tightening commenced on the second day of closure and was per-

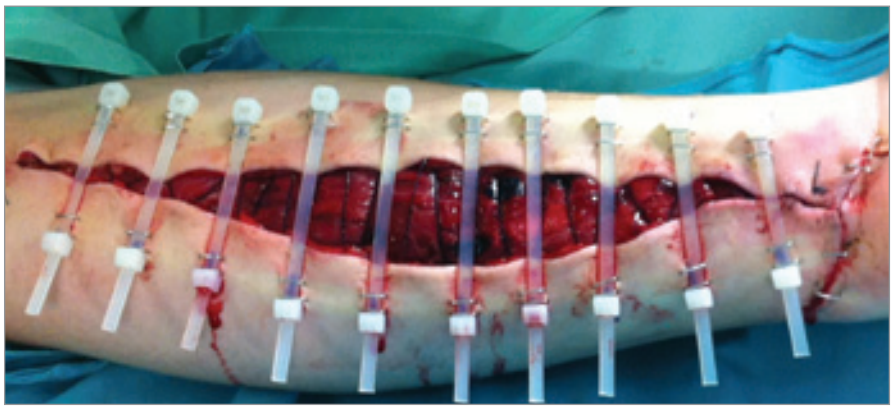

Fig. 1. Left forearm fasciotomy wound after application of cable ties plus absorbable barbed suture.

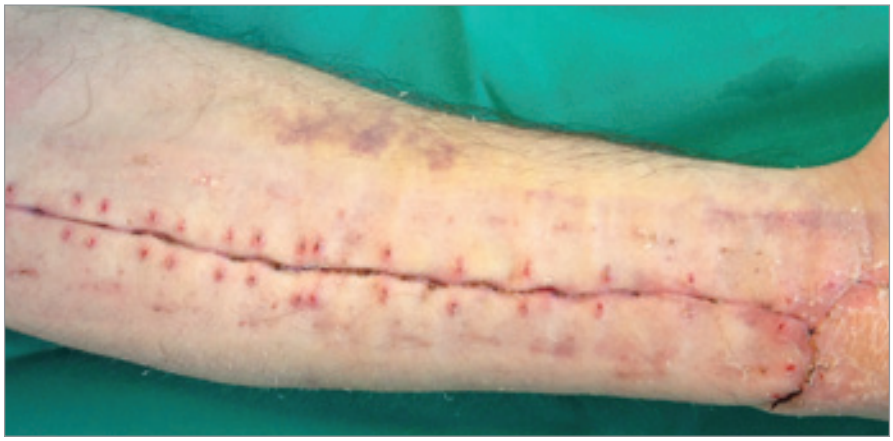

Fig. 2. Left forearm fasciotomy wound after removal of skin staples.

formed bedside with i.v. analgesia. The tightening and approximation of the wound were performed every 48 hrs. Complete wound closure was achieved on the eighth postoperative day. Cable ties were removed 5 days later and the skin staples after 2 weeks (Fig. 2).

The second is a 39-year-old patient who sustained an open fracture of his left tibia. External fixation and end-to--end repair of the anterior tibial artery were performed. Two hours after surgery, he started displaying signs of compartment syndrome. Fasciotomy was performed through medial and lateral approaches. The leg was strictly elevated and the closure process was identical to the first patient, initiated three days after the fasciotomy. Complete closure of the wound was achieved in 2 weeks.

Discussion

Both techniques have already been described in the literature as very successful. Govaert et al. described their experience with Ty-raps, which is a commercial brand of cable ties [5]. They reported their experience with 13 patients and 23 extremity fasciotomy wounds with excellent results in 91% of cases and only one patient required revision. In addition to excellent results, the authors emphasised the low cost and general availability of the technique. The second technique, described by Özyurtlu et al. [4], was reported in a five-case pilot study. In all patients, they achieved wound closure in mean 8.6 days (8–14), with no reported complications. They described their method as easy, rapid, and effective. By analysing both methods we found that each had its own shortcomings. The Ty-raps alone achieved dermotraction only on the part of the wound where the cable ties were positioned. The parts of the wound between the ties were lagging behind. In those spaces the skin edges became inverted and they were more difficult to advance. Once the wound was completely closed, this produced an uneven scar with prolonged scar formation. Secondly, the cable ties can cause pressure sores on the underlying skin. Absorbable barbed suture closure devices alone had the drawback of exhibiting tension for wound closure only on small segments which can lead to suture detachment from the wound edge and a mandated return to the OR.

Conclusion

By combining these two methods we feel we have found a way to overcome shortcomings of both. The absorbable barbed suture, when positioned correctly, helps to achieve dermotraction in the spaces between cable ties and reduces skin edge inversion by guiding skin edges towards each other, while the cable ties relieve the tension on the V-lock and reduce the chance of suture detachment. We believe that the combination of these two techniques has the potential to produce superior results to each technique performed separately, at a comparable cost and duration of closure.

Roles of authors
Kresimir Bulić and Hrvoje Kisić – clinical procedures;
Luka Bulić, Eva Brenner and Mia Lorencin Bulić – manuscript preparation;
Kresimir Bulić – supervision.
All authors have reviewed the manuscript and agree with its submission.

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